UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,451	06/07/2006	Zhongding Lei	1415.P013US/ADR/ayu	5074

38556 7590 01/22/2009

LAWRENCE Y.D. HO & ASSOCIATES PTE LTD
30 BIDEFORD ROAD, #02-02, THONGSIA BUILDING
SINGAPORE, 229922
SINGAPORE

EXAMINER	
TIMORY, KABIR A	

ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
01/22/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,451	LEI ET AL.	
	Examiner	Art Unit	
	KABIR A. TIMORY	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. This office action is in response to the amendment filed on 11/10/2008. Claims 1-34 are pending in this application and have been considered below.

Request for Continued Examination (RCE) Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/08 has been entered.

3. Applicant's arguments with respect to claim 1 have been considered but are moot in view of new ground(s) of rejection because of the amendments.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-3, 6, 7, 10-17, 20-23, 26-29, and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (US 6,067,292) in view of Kadous et al. (US 6654408).

Regarding claim 1:

As shown in figures 1-23, Huang et al. discloses in a receiver of a communication system, a method for reducing noise in a transformed signal (col 1, lines 35-37), said transformed signal having a plurality of signal components on different subcarriers which are orthogonal to each other (col 2, lines 11-25), said method comprising the steps of:

- receiving the transformed signal by a detector of said communication system (603 and 604 in figure 6);
- processing the plurality of signal components of said received transformed signal (605 in figure 6, 2203, in figure 22), wherein said processing step comprising:
- reconstructing (606 and 607 in figure 6, 607, 606 in figure 22) a predetermined number of times, by a reconstructing module, said identified one or more signal components (figures 22 and 23); and
- replacing said identified one or more signal components for reconstruction in said received transformed signal (figure 8) with the reconstructed one or more signal components to provide a new transformed signal having one or more reconstructed signal components (col 7, lines 65-67, col 8, lines 1-22).

Huang et al. disclose all of the subject matter as described above except for specifically teaching identifying one or more signal components having one or more smallest channel coefficients based upon a channel estimate of said plurality of signal components; with reduced noise; to thereby reduce noise in said identified one or more components; thereby outputting the new transformed signal with reduced noise.

However, Kadous et al. in the same field of endeavor teach identifying one or more signal components having one or more smallest channel coefficients based upon a channel estimate of said plurality of signal components (figures 1 and 7, col 6, lines 1-6, col 8, lines 20-42); with reduced noise; to thereby reduce noise in said identified one or more components; thereby outputting the new transformed signal with reduced noise (col 12, lines 47-59). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the to use the system method of channel coefficient estimation and noise reduction as taught by Kadous et al. to modify the system and method Huang et al. in order to cancel the effect phase noise in the receiver.

Regarding claim 2:

Huang et al. further discloses wherein said processing step comprises the step of providing an estimated signal from said transformed signal at output of said detector and based upon said channel estimate (700 and 700' in figure 7, col 8, lines 43-46).

Regarding claim 3:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said estimated signal using a plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 6:

Huang et al. further discloses wherein said reconstructing step further comprises the step of providing another estimated signal from said reconstructed transformed signal at said output of said detector and based upon said channel estimate (figures 7, 8, and 9).

Regarding claim 7:

Huang et al. further discloses wherein said processing step further comprises the step of decision processing said another estimated signal using said plurality of decision modules (2301, 2302, 2303, and 2304 in figure 23).

Regarding claim 10:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether said one or more signal components has been reconstructed said predetermined number of times (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 11:

Huang et al. further discloses wherein said reconstructing step further comprises the step of determining whether to process another one or more signal components of said plurality of signal components (606 and 607 in figure 6, col 8, lines 31-36).

Regarding claim 12:

Huang et al. further discloses and further comprising the step of providing current estimated signal for subsequent processing when determined that iteration of said another signal component is not required (this limitation is interpreted to be part of decision making) (2203 in figure 22).

Regarding claim 13:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 14:

The method as claimed in Claim 13, wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said another one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claim 15:

Huang et al. further discloses wherein said reconstructing step further comprises the step of simultaneously reconstructing two or more of said one or more signal components (606 and 607 in figure 6).

Regarding claim 16:

Huang et al. further discloses wherein said reconstructing step further comprises the step of reconstructing, one at a time, each of said one or more signal components (606 and 607 in figure 6).

Regarding claims 17, 23, and 29:

As shown in figures 1-23, Huang et al. discloses a receiver for reducing noise in a transformed signal, said transformed signal having a plurality of signal components on different subcarriers which are orthogonal to each other(col 2, lines 11-25), said receiver comprising:

- a signal reconstructing section (606 and 607 in figure 6) having:
- a detector for detecting said transformed signal (603 and 604 in figure 6);
- one or more decision modules (2301, 2302, 2303, and 2304 in figure 23), each of said one or more decision modules having an input coupled to output of said detector (see figure 23); and
- a reconstructing module (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23) having one or more inputs (1710, 1710', 1710" in figure 23), said one or more inputs being respectively coupled to output of said one or more decision modules (see figure 23),
- wherein said identified one or more signal components are reconstructed (1710, 1710', 1710" in figure 23) a predetermined number of times to thereby reduce noise; and
- wherein the identified one or more signal components for reconstruction are replaced with the reconstructed one or more signal components (col 7, lines 65-67, col 8, lines 1-22).

Huang et al. disclose all of the subject matter as described above except for specifically teaching wherein said reconstructing module is adapted to identify one or more signal components having one or more smallest channel coefficients based upon

a channel estimate of said plurality of signal components; to thereby form a new transformed signal with reduced noise.

However, Kadous et al. in the same field of endeavor teach wherein said reconstructing module is adapted to identify one or more signal components having one or more smallest channel coefficients based upon a channel estimate of said plurality of signal components (figures 1 and 7, col 6, lines 1-6, col 8, lines 20-42); to thereby form a new transformed signal with reduced noise (col 12, lines 47-59). Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the to use the system method of channel coefficient estimation and noise reduction as taught by Kadous et al. to modify the system and method Huang et al. in order to cancel the effect phase noise in the receiver.

Regarding claims 20, 26, and 32:

Huang et al. further discloses wherein said reconstructing module (606, 607 in figure 22) is adapted to perform reconstruction based on a relationship between a received signal component and a transmitted signal (figures 1, 2, and 6 col 17, lines 30-33).

Regarding claims 21, 27, and 33:

Huang et al. further discloses wherein said reconstructing module is adapted to perform simultaneous reconstruction of two or more of said one or more signal components (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

Regarding claims 22, 28, and 34:

Huang et al. further discloses wherein said reconstructing module is adapted to perform reconstruction of said one or more signal components signal components one at a time (606 and 607 in figure 6, 1710, 1710', 1710" in figure 23).

6. Claims 4, 5, 8, 9, 18, 19, 24, 25, 30, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. in view of Kadous et al. as applied to claims 3, 7, 17, 23, and 29 above and further in view of Dabak et al. (US 2003/0002568).

Regarding claims 4, 8, 19, 25, and 31:

Huang et al. and Kadous et al. disclose all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of soft decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of soft decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and

to reduce noise and interference in the system. In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Regarding claim 5, 9, 18, 24, and 30:

Huang et al. and Kadous et al. disclose all of the subject matter as described above except for specifically teaching wherein said decision processing step comprises the step of hard decision processing.

However, Dabak et al. in the same field of endeavor, teaches wherein said decision processing step comprises the step of hard decision processing (23 in figure 2, par 0041, lines 1-22).

One of ordinary skill in the art would have clearly recognized that there are algorithms to perform soft/hard decision in the system such as Viterbi decoding methodology. The soft decision algorithm makes a soft decision on the bits and the hard decision algorithm makes a hard decision on the received bits. These two methodologies are used for channel estimation and maximum likelihood decoding and to reduce noise and interference in the system. In order to minimize the noise and interference in the system, it would have been obvious to one ordinary skill in the art at the time the invention was made to use the soft/hard decision decoding and decision making methodologies as taught by Dabak et al. in multi-path interference cancellation

for transmit diversity. By doing so, we can reduce noise and intra symbol interference (ISI) in the system.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KABIR A. TIMORY whose telephone number is (571)270-1674. The examiner can normally be reached on 6:30 AM - 3:00 PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on 571-272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kabir A Timory/
Examiner, Art Unit 2611
/Shuwang Liu/
Supervisory Patent Examiner, Art Unit 2611